Convective Modes Associated with Significant Severe Thunderstorms in the Contiguous United States

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A sample of more than 17,000 significant severe thunderstorm ($\geq$ 2 inch diameter hail, $\geq$ 65 kt wind gusts) events and tornadoes was compiled for the seven year period from 2003-2009. The reports were filtered by the hour using the maximum event per severe report type on a 40 km horizontal grid, and WSR-88D level II (or level III) archived data were examined with the intent of assigning a specific convective mode to each event. The following base convective modes were possible for each case: cell, cluster, and quasi-linear convective system (QLCS). Within these base modes, right-moving and left-moving supercells were identified, as well as storms displaying marginal supercell characteristics. A subjective estimate of mesocyclone strength (using peak-to-peak azimuthal velocity differences) was included for each supercell. Any events occurring in association with tropical cyclones were documented. Many challenges were encountered in the assignment of convective mode. There were occasional difficulties discriminating between lines, clusters, and cells. However, the most common difficulty involved the identification of supercells within linear convective systems. Many cyclonic circulations meeting the minimum mesocyclone criteria occurred within convective lines, yet the structure of those circulations were not always clearly identifiable as "mesovortices" along a line, or deeper mesocyclones with embedded supercell structures. A separate "hybrid" category was created in deference to these mode identification difficulties.

The relative frequencies of convective modes by event type will be presented, along with the temporal and spatial distributions of the various convective modes for each event type